

Room temperature synthesis and luminescence of β -NaGdF₄: Eu³⁺, Er³⁺, and Yb³⁺, Er³⁺ nanocrystals

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Phase pure hexagonal β -NaGdF₄: Eu³⁺, Er³⁺ samples of less than 10 nm particle size were synthesized in ethylene glycol within 24 hours at room temperature. The materials were characterized by powder X-ray diffraction, electron microscopy, and luminescence spectroscopy. The luminescence and energy transfer between Gd³⁺, Eu³⁺, and Er³⁺ ions were investigated upon UV excitation.

β -NaGdF₄: Yb³⁺, Er³⁺ nanoparticles were prepared by microwave heating in ethylene glycol and ionic liquid mixtures. The synthesis was optimized for green Er³⁺ upconversion emission under 970 nm excitation. Solvent composition, water content, core/shell structure, and reaction temperature were identified as key parameters for material synthesis. 10 nm core/shell particles achieved more than 1/1000 of bulk material upconversion intensity, see the Figure.

